

swarming on thistles, with a few *G. rhamni* ♂ ♂ and ♀ ♀, *P. brassicae*, *A. urticae*, *D. paphia*, which was very worn; I only saw two specimens of *Hipparchia semele*, when last year it was abundant; also a few *P. icarus*. Up to now *P. icarus* has been conspicuous by its absence, I have seen only about four specimens of it this season.

I paid another visit to Oxshott on the evening of August 28th. I found *X. fulvago* common, just emerged. This moth seems to like sitting on tall grass stems in the vicinity of willow bushes, and is a most conspicuous insect in the rays of the light.

During the first fortnight in September I was again in Shropshire, and have never seen *V. io* in such abundance as I did between the 6th and 10th, every field that had scabious growing in it simply swarmed with this insect. *Polygonia c-album* was found more frequent than usual; this species seems to like scabious growing just outside a wood, and the individuals seem to stick to the same spot day after day. I also noticed a few *Pyrameis cardui*, *P. atalanta* and *Aglais urticae*. *P. icarus* was common, the first time I have found it commonly this year.

I spent an hour or two pupa digging, getting a few dozen pupae, the only ones to emerge so far being *Hadena protea* and *Cidaria miata*, which appeared on the 16th of September.

This practically ended the season as far as I was concerned.

Geographical Variation in *Hipparchia semele*, L.

By ROGER VERITY, M.D.

(Concluded from page 156.)

Let us now examine the races which constitute the various grades of lines A and E, classifying them according to the average intensity and extent of the network on the underside of the hindwing. One finds these two lines divide in corresponding grades, and that roughly the corresponding ones often are found in about the same regions, and follow each other from north to south, so that a very natural and convenient classification is obtained. The same order is suggested by the tone of the suffusion, which turns, as already stated, from dark grey to light grey and then to tawny, according to the general rule in Lepidoptera that dry heat turns black into tawny. This of course is much more conspicuous in line E than in A, because in the latter the suffusion is limited in extent.

Grade I.: Line A is represented in this grade by race *scota*, Vrt., *Bull. Soc. Ent. France*, 1911, p. 313, pl. I., fig. 10, one of the most distinct of the species; it is the smallest in size: the fulvous is so extensive, it is only surpassed by *aristaeus* and equalled by *siciliana*, but it is of an extremely dull, pale yellowish tone: the network of the underside is very thick and very deep black in tone and uniformly spread all over the wing, so that the narrow, white, band-like space only just shows through it vaguely; the black streak, which usually marks its inner outline in all the other races is obliterated here. My "types" are from the northern coast of Scotland. It is remarkable that the greatest amount of fulvous exhibited by the species should thus be produced in the extreme north and in the extreme south of Europe (Corsica, Sardinia, and Sicily). The English race is larger than *scota*, but always smaller than the continental ones, and, in other

characters too, it answers the designations either of race *scota trans. ad jubaris* and *ad semele* or of *jubaris* and of *semele trans. ad scota*, coming nearer one or the other of these races, according to latitude and localities.

Tutt, in his *Handbook of Brit. Butts.*, p. 398 (1896), points out the difference of upperside between the male of line A and that of line E, and names *suffusa* the extreme individual form of the latter, describing it as "almost unicolorous without pale bands." This name should, I think, be used as Tutt meant it to be, for the particularly melanic individuals of any race they may occur in. One must make a very clear distinction between this sort of name and those which apply to an entire race or generation, taken on the whole, and which stand, as rule, for a combination of various characters. These must all be taken into account when the name is used. It was very misleading of Tutt to apply the name of *aristaeus*, Bon., to British females "with rich fulvous transverse bands." As to the two English races of lines A and E, I have hesitated as to whether they should be named or not. The fact they are so much collected and handled and that they represent entities of particular interest to the numerous British entomologists has, however, pushed me to suggest a less cumbersome way of designating them than the "*trans. ad*" form. I thus propose the names of **angliae**, mihi, for the race describable, in size and pattern, as intermediate between *scota* and *jubaris*, and of **anglorum**, mihi, for that of line E, smaller than nymotypical *semele* and with an average darker underside.

Line E is found in grade I. in race *cadmus*, Frühstorfer, *Int. Ent. Zeit. Guben*, April, 1908, p. 10, described from Klausen in South Tyrol, and recorded in the original description also from the Valais, the Simplon route, Zermatt, and Geneva. I possess it from Oropa in Piedmont, from Moravia (transitional to *semele*), from Mt. Sumbra, m. 1,200, in the Apuane Alps (N. W. of Tuscany), and from Saint Come Bazas (S.-W. of France), so that its range is very extensive in the southern part of Central Europe. The characteristics of line E, described above, are exhibited by this race to their highest degree (fulvous very limited and very warm in tone on upperside; very reddish also on underside of forewing; underside of hindwing dark suffusion, very black and extensive, greatly restricting and often nearly abolishing the white band-like space, which, anyhow, is always covered over by the thick black network of streaks). All these characters are evidently the result of warm, damp surroundings.

Grade II. consists of the races found in the northern part of Central Europe. They are very variable, individually and locally, and they are only surpassed in this respect by *aristaeus*. In size they range from that of the English races to the larger size of more southern ones, and the average is about intermediate. In pattern and colour they culminate in two widely different forms, very characteristic of line A and of E respectively. The former has been called *jubaris* by Frühstorfer (*l.c.*) from "types" of Eastern Prussia, described as having "very prominent bands of a light ochre yellow on all the wings." It should be added that in this form the underside of the hindwings is very light in general tone; network thin; quite absent

on the broad, white, band-like space, which is left uncovered by the very limited suffusion; the latter is also of a very light gray or tawny. The specimens I have from the northern coast of France (Paris-Plage, in the Pas-de-Calais) are the most characteristic I have seen. The form of line E, which belongs to grade II., is that which I take to be the nymotypical one of *semele*, although I cannot affirm that this is its proper name, because I am not acquainted with the Swedish race. This last is certainly nymotypical, Linneus's first quotation being his own description in *Fauna Svecica*. By naming *jubaris*, Frühstorfer has restricted the Linnean name to the darker form, with no fulvous on the forewing of the male (or only two or three small spots), with this colour more limited generally in both sexes, and of a warmer tone, and with a much darker underside to hindwings; the network is thicker and more extensive, although less so than in *scota*; the suffusion is blackish; in the male they both leave, as a rule, a complete, and sharply outlined band-like space of a pure white, which stands out boldly on the darkened remaining parts of the wing; in the female this space is entirely obliterated or vaguely visible through the network. I possess this race from the Pont-de-l'Arche (Eure) and from Les Boutardières (Maine-et-Loire). It evidently is found in some localities and *jubaris* in others of the same regions. There remains to establish definitively whether it is found in Sweden, and whether it thus really is nymotypical *semele*.

Grade III. is exhibited, in line A, by race *teres*, Frühstorfer (*l.c.*), described from Digne in the Basses Alpes, which takes the place of *jubaris* in the south of Europe. It is on the whole larger than the latter, of a slightly warmer tone of fulvous, and distinctly a grade lighter on the underside; the white ground colour has often a slightly golden hue and it is broadly uncovered, forming a very wide band, because the dark suffusion is very limited and of a very pale transparent gray, or yellowish-gray; the net-work is very thin and in some individuals obliterated on extensive areas; in others it spreads all over the wing, but the white band is not much obscured by it, owing to the extreme slenderness of the little streaks. Near Florence the race is found on Mt. Conca, m. 400, on the northern slopes of Mt. Morello, whereas, only a few miles away, on the blazingly hot and parched Mt. Fanna, 600 m., one finds the race I am about to describe.

Grade III. of line E is the race which replaces *cadmus* in peninsular Italy; the fulvous of the upperside is perhaps a little less saturated, and more vivid, but otherwise that surface resembles it exactly in the male sex by the total, or nearly total, absence of fulvous on the forewing and by the small triangular patches of the hindwing; the forewing of the female exhibits broad spots, clean-cut in outline and of a clear, brilliant fulvous, which stand out boldly, and confer a strikingly finer appearance to this race than to the other continental races. The underside of hindwings is distinctly different from *cadmus*, because the general tone is much lighter; this is due to the fact that the network is thinner and the suffusion is of a very pale gray (it will be observed that this is the very character which distinguishes the race of *Pararge megera*, L., of this region, from those found further north and west); the central white band-like space is never entirely abolished in the male, as is often the case in the darkest *cadmus* individuals, but it is always narrow, irregular in outline, and usually most of it is veiled over by the

thin network, so that it does not stand out, as it does on the darker wing of nymotypical *semele*. Individual variation, however, is considerable, because the darkest individuals point to *caalmus*, whereas the lighter ones approach *teres* in some cases, and recall distantly the uniform gray of *mersina* in others; the first mentioned are met with chiefly in Tuscany; apart from these, I detect no differences between my series of Tuscany and those collected in the Aspromonte, at 1,200 m., in southern Calabria. I name it **paeninsulitaliae**. "Types," from Mt. Fanna, 600 m., near Florence.

Grade IV. in line A is the culminating degree of reduction of the network of the underside, because in this line it is never entirely abolished, as it can be in B, C, and E. It is exhibited by race *siciliana*, Obth., *Et. Lép. Comp.*, X., p. 130, fig. 2315-6 (March, 1915), described from specimens "collected in Sicily by Bellier." I possess several collected by Ragusa at the Ficuzza and other localities. It is the largest race of the species, and one of the most striking. On the upper-side the fulvous is only surpassed in extent by *aristaens*, but it is not as bright and reddish as in the latter; in both sexes there is a very broad band across all the wings, but its inner outline is sharply defined and never shades off towards the base as in that race; in the female there is always a diffused patch in the middle of the forewing, usually more extensive than in *algorica*, but never blending completely with the band, as in *aristaens*. On the underside of the hindwings the dark suffusion is very pale and limited, so that a very broad central strip and a basal patch of the white ground colour are left uncovered. It is interesting to remark that the features of this Sicilian race and those of *aristaens* exactly correspond to those of *Pararge megera*, L., from the same regions: in both cases the greatest extent of fulvous produced by the species is found in Corsica and Sardinia, but the Sicilian race only just falls short of reaching it; in both cases it is combined with a very dark underside in the former region, and with the lightest produced by the species in the latter region. The parallelism is carried on also in Greece by the dark upperside combined with a light underside (in *senthes*, as in *lyssa*), and in the transitional race of Peninsular Italy (in *paeninsulitaliae*, as in *praeaustralis* and in *paeninsulitaliac*). One wonders how local causes can produce such resemblances in all these regions in two species so little like each other! It shows to what an extent surroundings influence some variations, whereas others are evidently, to a considerable degree, produced independently of this influence, the characters of line A and those of line E occurring in the same regions, and even on the same grounds, as individual variations. In Sicily the differences between the races of these two lines A and E are more accentuated than in any other region:—

Grade IV. of line E consists, there, in a race I have from the Caronie Mts., at high altitudes, which contrasts very markedly with *siciliana* by its smaller size, very limited extent of fulvous above (none on forewing of male), which is also more saturated and reddish in tone, and by the remarkably dark underside of the hindwings, with a narrow, but very clear white and sharply outlined band-like space standing out on them. At first sight all this seems quite as in nymotypical *semele* of the north; further observation shows instead that in the Sicilian race the black network is as limited in extent as in *siciliana*, but that it is replaced here by the dark suffusion, which is usually black, and very extensive,

absorbing what little network there is. This race seems to be the one Frühstorfer has described by a few vague words, from the female alone, in the *Entom. Zeitschr.*, 1908, p. 93, under the name of *blachieri*. In 1914 I made the mistake of describing in the *Bull. Soc. Ent. Italiana*, XLV., p. 219, the male of *siciliana*, Obth., as that of *blachieri*, but, now I am acquainted with the two Sicilian races, I can see that the darker one is that named by Frühstorfer. Both these authors are wrong in stating their race is a near ally of *algorica*. Stauder, too (*Zeit. wissen. Insektenbiol.*, 1916, p. 59), is not correct when he refers his *semele* of Sorrento and of Calabria to *blachieri* or a transition to it; they, of course, are *paeninsulitaliae* and thus, if anything, they point distantly to *mersina*, and on the underside rather to *siciliana*, on account of the light gray tinge of the suffusion.

As grade V. of line E I consider race *mersina*, Stdgr., *Cat. Lep. Pal.* II. ed., p. 28 (1871), described from Mersina in Cilicia, and found in the north of Asia Minor generally and in Syria, either in well characterised forms or in others transitional to the races of Greece. In the former case the upperside has very limited fulvous spots in the male and those of the female resemble *paeninsulitaliae*. The characteristic of this race, however, consists in the absence of network and in the nearly uniform gray, or brownish-gray suffusion on the underside of the hindwings of the male, which thus stands well as the culminating degree of line E. Race *maderensis*, Baker, of Madeira, described as extremely dark on both surfaces, I cannot place, because I am not acquainted with it. I can only say the same of *diffusa*, Butler, from Asia, also described as very dark.

The relationship of the different lines of variation just described is an interesting subject, but it can only be developed well by dealing more generally with the variations of other genera. The following table may be found useful as a summary and as a help to one's memory, but I cannot claim it to be a true representation of the positions the lines occupy as compared with each other, because they cannot be shown on a single plane. If one places on the plane of the page the lines I have called A and E, because they consist in the two groups of races, whose features differ more widely from each other, the other lines should not stand between them, but on other planes. The space between A and E is filled up by the numerous individual forms of transition one meets with continually in nature, and which do not in the least pass through B and C. Line D, if anything, is a combination of upperside and underside characters, which is actually found amongst them. Line B of *aristaeus*, by the extent of fulvous on the upperside, should stand before A, but the underside of many individuals swings the balance so far towards E, that one feels obliged to place it between these lines, and the resemblance of some females to some of *algorica*, also suggests that these two lines, B and C, should be kept close to each other. Line C certainly stands quite apart on account of the shape of the fulvous spots on the forewing of the male above; their similarity to those of the female and consequent lesser sexual dimorphism suggests that the more extensive and continuous band of the male in line A and the tendency, on the contrary, to obliteration of the fulvous in line E, might be two divergent variations, which have sprung from it. That is why I have placed *algorica* in a central position. Its underside, however, brings it markedly nearer to line E than to A.

	A	B	C	D	E
I. :	<i>scota</i>	...			<i>cadmus</i>
II. :	<i>jubaris</i>	...			<i>semele</i>
III. :	<i>teres</i>	<i>aristaens</i>		{ <i>senthes</i> <i>apenninigena</i> }	<i>paeninsulitaliae</i>
IV. :	<i>siciliana</i>	...	<i>hibera</i>		<i>blachieri</i>
V. :		...	{ <i>pallidalgirica</i> <i>algrica</i> }		<i>mersina</i>

The Roman figures indicate decreasing grades in the extent and thickness of the black network on the underside of the hindwings. In column B the dots are meant to show that individual variation is so unusually broad as to cover all the grades in a single race. It must be borne in mind that individual variation does in most races embrace more than one grade, but to a much lesser extent than in *aristaens*. In A line of variation the fulvous of the upperside is extensive, and its tone is not saturated, although it does become slightly warmer and brighter from I. to IV.; on the forewing of the male it forms a broad continuous band; on the underside of the hindwings the dark suffusion is limited and pale, as compared with the other lines, and it becomes increasingly so from I. to IV.

In B the fulvous of the upperside is more extensive than in any other line, and it spreads to the base of the wings; its tone is very warm and bright; on the underside of the hindwings the dark suffusion is always very extensive, whatever extent the network has.

In C the fulvous of the upperside is intermediate in extent between A and E; on the forewing of the male it is divided, in grade V., into spots, as in female; its tone varies as in A; suffusion of the underside very extensive, and particularly so in grade V., but tawny rather than black.

In D the fulvous of the upperside is as limited as in E, but as cold in tinge as in A; the underside suffusion is limited and pale, as in the corresponding grade of line A.

In E the fulvous of the upperside is very limited in extent, especially in the male sex, in which it is more or less entirely obliterated on the forewing; it is of a very saturated, warm tinge, and often very bright; the underside suffusion is dark and usually very extensive, but more particularly so in grade V.; from I. to V. it turns on broad lines from dark gray to light gray, and then to tawny, except in *blachieri*, where it is quite as black as in *cadmus*.

NOTES ON COLLECTING, etc.

BOARMIA ABIETARIA AT GRAVESEND.—In August, 1922, I captured two *B. abietaria*, a male in fair condition on August 14th, beaten from a yew, and a female on August 17th in perfect condition on the trunk of a beech tree close to the same yew tree, when sugaring.

This insect is new to this district. Is it new to Kent?—F. T. GRANT, 37, Old Road West, Gravesend.

AN EARLY APPEARANCE OF EUPITHECIA PUMILATA.—On January 25th, I saw an apparently recently emerged example of *E. pumilata* resting on the wall of my sitting-room. Our authorities tell us that it can be